

CLAIMS

1. A method for selectively transferring onto a planar display substrate pixel control devices each controlling a plurality of pixels, comprising the steps of:

fixing onto a support substrate a substrate for pixel control devices each having a surface thereof provided with a plurality of integrated circuits, each of which controls a plurality of pixels;

fixing onto a substrate for pickup the pixel control devices on the substrate for pixel control devices that has been cut every one integrated circuit; and

causing the pixel control devices on the substrate for pickup to be chucked and retained onto a pickup device and transferring onto the planar display substrate the pixel control devices chucked and retained on the pickup device;

wherein a plurality of pixel control devices are formed on the substrate for pixel control devices at a first direction array pitch px/m that is obtained by dividing an array pitch px in a first direction on the planar display substrate by a natural number m and at a second direction array pitch py obtained by dividing an array pitch py in a second direction on the planar display substrate that is orthogonal to the first direction by a natural number n ; and

wherein a number of the pixel control devices only corresponding to the array pitches px and py of the planar display substrate are selectively chucked and retained on the pickup device from the pixel control devices fixed onto the substrate for pickup and then transferred onto the planar display substrate.

2. A method for selectively transferring onto a planar display substrate pixel control devices each controlling a plurality of pixels with a integrated circuit, comprising the steps of:

fixing onto a support substrate a substrate for pixel control devices having a surface thereof provided with a plurality of integrated circuits each controlling a plurality of pixels;

fixing onto a substrate for pickup the pixel control devices on the substrate for pixel control devices that has been cut every one integrated circuit; and

causing the pixel control devices on the substrate for pickup to be chucked and retained onto a pickup device and transferring onto the planar display substrate the pixel control devices chucked and retained on the pickup device;

wherein a plurality of pixel control devices are formed on the substrate for pixel control devices at a first direction array pitch p_x/m that is obtained by dividing an array pitch p_x in a first direction on the planar display substrate by a natural number m and at a second direction array pitch p_y obtained by dividing an array pitch p_y in a second direction on the planar display substrate that is orthogonal to the first direction by a natural number n ;

wherein the pickup device has vacuum chuckholes formed therein at an array pitch p_x in a direction corresponding to the first direction and an array pitch p_y in a direction corresponding to the second direction for chucking the pixel control devices; and

wherein a number of the pixel control devices only corresponding to the array pitches p_x and p_y of the planar display substrate are selectively chucked and retained on the pickup device from the pixel control devices fixed onto the substrate for pickup and then transferred onto the planar display

substrate.

3. A method for selectively transferring onto a planar display substrate pixel control devices each controlling a plurality of pixels with a integrated circuit, comprising the steps of:

fixing onto a support substrate a substrate for pixel control devices having a surface thereof provided with a plurality of integrated circuits each controlling a plurality of pixels;

fixing onto a substrate for pickup the pixel control devices on the substrate for pixel control devices that has been cut every one integrated circuit; and

causing the pixel control devices on the substrate for pickup to be chucked and retained onto a pickup device and transferring onto the planar display substrate the pixel control devices chucked and retained on the pickup device;

wherein a plurality of pixel control devices are formed on the substrate for pixel control devices at a first direction array pitch p_x/m that is obtained by dividing an array pitch p_x in a first direction on the planar display substrate by a natural number m and at a second direction array pitch p_y obtained by dividing an array pitch p_y in a second direction on the planar display substrate that is orthogonal to the first direction by a natural number n ; and

wherein a mounting apparatus comprising a pixel control device stage for disposing thereon the substrate for pickup and provided with a rotation angle adjustment mechanism, a substrate stage for disposing thereon the planar display substrate and provided with a rotation angle adjustment mechanism, a pickup device provided with a vacuum chuck that has vacuum chuckholes formed therein at an array pitch p_x in a direction

corresponding to the first direction and an array pitch p_y in a direction corresponding to the second direction for chucking the pixel control devices and X-axis, Y-axis and Z-axis regulating mechanisms is used to selectively chuck and retain a number of the pixel control devices only corresponding to the array pitches p_x and p_y of the planar display substrate on the pickup device from the pixel control devices fixed onto the substrate for pickup and then transfer the chucked and retained pixel control devices onto the planar display substrate.

4. A method for selectively transferring onto a planar display substrate pixel control devices each controlling a plurality of pixels with a integrated circuit according to any one of claims 1 to 3, wherein each of the pixel control devices controls 3 colors x 4 pixels arrayed in 2 columns and 6 rows with an integrated circuit and transferred to a center of the pixels arrayed in 2 columns and 6 rows.

5. A method for selectively transferring onto a planar display substrate pixel control devices each controlling a plurality of pixels with a integrated circuit according to any one of claims 1 to 3, wherein the substrate for pixel control devices is attached to the support substrate, with the surface of the substrate for pixel control devices provided with the plurality of integrated circuits directed downward toward the support substrate, in the step of fixing onto the support substrate the substrate for pixel control devices having the surface thereof provided with the plurality of integrated circuits and, in the step of fixing onto the substrate for pickup the pixel control devices on the substrate for pixel control devices that has been cut every one integrated circuit, the pixel control devices are transferred onto a surface of the substrate for pickup, with the substrate for pixel control

devices upside down, and the substrate for pixel control devices is cut every one integrated circuit after the surface of the substrate for pickup is directed upward.

6. A method for selectively transferring onto a planar display substrate pixel control devices each controlling a plurality of pixels with a integrated circuit according to any one of claims 1 to 3, wherein the substrate for pixel control devices is attached to the support substrate, with the surface of the substrate for pixel control devices provided with the plurality of integrated circuits directed downward toward the support substrate, in the step of fixing onto the support substrate the substrate for pixel control devices having the surface thereof provided with the plurality of integrated circuits and, in the step of fixing onto the substrate for pickup the pixel control devices on the substrate for pixel control devices that has been cut every one integrated circuit, the pixel control devices are transferred onto a surface of the substrate for pickup, with the substrate for pixel control devices upside down, after the substrate for pixel control devices is cut every one integrated circuit, with the surface thereof directed downward toward the support substrate.

7. A mounting apparatus for performing the method for selectively transferring pixel control according to any one of claims 1 to 6, which comprises a pixel control device stage for disposing thereon a substrate for pickup and provided with a rotation angle adjustment mechanism, a substrate stage for disposing thereon a planar display substrate and provided with a rotation angle adjustment mechanism, a pickup device provided with a vacuum chuck that has vacuum chuckholes formed therein at an array pitch p_x in a direction corresponding to a first direction and an array pitch p_y in a

direction corresponding to a second direction for chucking the pixel control devices and X-axis, Y-axis and Z-axis regulating mechanisms, which is used to selectively chuck and retain a number of the pixel control devices on the pickup device and then transfer the chucked and retained pixel control devices onto the planar display substrate and which has a function to move in three directions orthogonal to one another utilizing the X-axis, Y-axis and Z-axis regulating mechanisms.

8. A wiring formation method after transfer of the pixel control devices for controlling a plurality of pixels according to any one of claims 1 to 6, comprising the steps of forming wirings inside the pixel control devices so that the inside wirings pass through the pixel control devices and forming wirings on a planar display substrate by screen printing using a screen mask that has a predetermined pattern corresponding to the wirings formed on the planar display substrate and to be connected to the inside wirings of the pixel control devices in broken-line patterns.

9. A planar display substrate on which pixels, pixel control devices and wirings for connecting the pixels and the pixel control devices are formed, wherein the pixels are arrayed in i columns and j rows, and wherein each of the pixel control devices controls a plurality of pixels with one integrated circuit, is disposed at a substantially center of an area of a product of $i \times j$ and is connected to the pixels via wirings using a common region.

10. A planar display substrate on which pixels, pixel control devices and wirings for connecting the pixels and the pixel control devices are formed, wherein the pixels are arrayed in i columns and j rows and wherein each of the pixel control devices controls a plurality of pixels with one integrated

circuit, is disposed at a substantially center of an area of a product of $i \times j$, is connected to the pixels via wirings using a common region and is transferred by the method according to any one of claims 1 to 6.

11. A planar display substrate according to claim 9 or claim 10, wherein the product of $i \times j$ is a multiple of 3 and the pixel control devices control a plurality of pixels with a single integrated circuit, with 3 pixels of three different colors as a pixel group.

12. A planar display substrate according to claim 9 or claim 10, wherein the pixel control devices control 3 colors \times 4 pixels arrayed in 2 columns and 6 rows with one integrated circuit and are disposed each at a center of the area of the product of 3×4 .

13. A planar display substrate according to any one of claims 9 to 12, onto which the pixel control devices are transferred by a method comprising the steps of fixing onto a support substrate a substrate for pixel control devices having a surface thereof provided with a plurality of integrated circuit each controlling a plurality of pixels, fixing onto a substrate for pickup the pixel control devices on the substrate for pixel control devices that has been cut every one integrated circuit and transferring onto the planar display substrate the pixel control devices on the substrate for pickup that have been selectively chucked and retained on a pickup device.